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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,243	01/26/2004	Shilin Chen	074263.0212 (SC-98-025)	4159

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EXAMINER

JONES, HUGH M

ART UNIT PAPER NUMBER

2128

DATE MAILED: 11/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/766,243

Applicant(s)

CHEN, SHILIN

Examiner

Hugh Jones

Art Unit

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 January 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/26/04, 9/9/04, 12/15/04

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Introduction

1. **Claims 1-4 of U. S. Application 10/766,243, filed on 1/26/2004 are presented for examination.**

Drawings

2. **Figures 10-12 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated.** See MPEP § 608.02(g). Figure 10 discloses a prior art drill rig; figure 11 discloses a prior art roller cone bit; figure 12 discloses a prior art drag bit. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. **Claims 1-4 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.** The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

- The specification does not disclose substantial detail relating to the design, simulation or optimization other than to define variables which are to be

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simulated and optimized. The specification refers to two papers by Ma (top, page 6, specification) which do disclose such essential details; however, the Ma papers were not incorporated by reference and thus do not cure the deficiency.

- Pages 16-18 of the specification also mention six possible embodiments but provide no substantial detail other than a mere listing of steps. It is also noted that the "means for" language in the specification (line 7, page 18 – "performing an **optimization means**") appears to be an improper attempt at incorporation by reference.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 1 recites "optimization means". Applicants are reminded that the claims do not invoke 112(6) paragraph ("means for" or "step for"). This follows from analysis of the claims and from Applicant's statement in the specification (Page 18, line 31 to page 19, line 4 – *emphasis added*):

"None of the description in the present application should be read as implying that any particular element, step, or function is an essential element which must be included in the claim scope: THE SCOPE OF PATENTED SUBJECT MATTER IS DEFINED ONLY BY THE ALLOWED CLAIMS. Moreover, none of these claims are intended to invoke paragraph six of 35 USC section 112 unless the exact words "means for" are followed by a participle."

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7. Since none of the claims meet said requirement for "means for" or "step for" language, the meaning of "means" is therefore open to considerable speculation, and the meaning of the claim cannot be determined.

8. MPEP section 2143.03 addresses the issue of applying prior art against such claims:

A claim limitation which is considered indefinite cannot be disregarded. If a claim is subject to more than one interpretation, at least one of which would render the claim unpatentable over the prior art, the examiner should reject the claim as indefinite under 35 U.S.C. 112, second paragraph (see MPEP § 706.03(d)) and should reject the claim over the prior art based on the interpretation of the claim that renders the prior art applicable. Ex parte Ionescu, 222 USPQ 537 (Bd. Pat. App. & Inter. 1984) (Claims on appeal were rejected on indefiniteness grounds only; the rejection was reversed and the case remanded to the examiner for consideration of pertinent prior art.). Compare In re Wilson, 424 F.2d 1382, 165 USPQ 494 (CCPA 1970) (if no reasonably definite meaning can be ascribed to certain claim language, the claim is indefinite, not obvious) and In re Steele, 305 F.2d 859, 134 USPQ 292 (CCPA 1962) (it is improper to rely on speculative assumptions regarding the meaning of a claim and then base a rejection under 35 U.S.C. 103 on these assumptions).

9. See also section 2173.06 (Prior Art Rejection of Claim Rejected as Indefinite):

All words in a claim must be considered in judging the patentability of a claim against the prior art. In re Wilson, 424 F.2d 1382, 165 USPQ 494 (CCPA 1970). The fact that terms may be indefinite does not make the claim obvious over the prior art. When the terms of a claim are considered to be indefinite, at least two approaches to the examination of an indefinite claim relative to the prior art are possible. First, where the degree of uncertainty is not great, and where the claim is subject to more than one interpretation and at least one interpretation would render the claim unpatentable over the prior art, an appropriate course of action would be for the examiner to enter two rejections: (A) a rejection based on indefiniteness under 35

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U.S.C. 112, second paragraph; and (B) a rejection over the prior art based on the interpretation of the claims which renders the prior art applicable. See, e.g., *Ex parte Ionescu*, 222 USPQ 537 (Bd. App. 1984). When making a rejection over prior art in these circumstances, it is important for the examiner to point out how the claim is being interpreted. ***Second, where there is a great deal of confusion and uncertainty as to the proper interpretation of the limitations of a claim, it would not be proper to reject such a claim on the basis of prior art.*** As stated in *In re Steele*, 305 F.2d 859, 134 USPQ 292 (CCPA 1962), a rejection under 35 U.S.C. 103 should not be based on considerable speculation about the meaning of terms employed in a claim or assumptions that must be made as to the scope of the claims. The first approach is recommended from an examination standpoint because it avoids piecemeal examination in the event that the examiner's 35 U.S.C. 112, second paragraph rejection is not affirmed, and may give applicant a better appreciation for relevant prior art if the claims are redrafted to avoid the 35 U.S.C. 112, second paragraph rejection.

10. There is a great deal of confusion and uncertainty *as to the proper interpretation of the limitations of claim 1 in particular because of the phrase "optimization means" which does not invoke "means for or step for" language . Thus, it would not be proper to reject such a claim on the basis of prior art.*

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The art is not being supplied because it is of record:

- Ma et al. ("The computer simulation of the interaction between roller bit and rock" – 1995 – *of record*) discloses:

optimal roller bit design using computer simulation (entire paper);

operational mechanics of the roller bit geometry ("The model of bit and bottom"; "roller bit"; "bottom hole");

kinematics of the bit ("The model of bit and bottom"; rotation angle of cone"; "The simulation of interaction");

rock-bit interaction and crater analysis ("crater model"; "Interaction between bit and rock");

bit design including force analysis ("The simulation of Interaction").

Ma ("The operational mechanics of the rock bit" – 1996 - *of record*) discloses:

optimal roller bit design using computer simulation (chapter 6) based on the entire teachings in the book, including

operational mechanics of the roller bit geometry (details in chapter 2);

kinematics of the bit (details in chapter 3);

rock-bit interaction (details in chapter 5); and

bit design including force analysis (see page 232: "evaluate the size, load, motion, stress, and strain of each part...").

- Warren et al. disclose ***teach that the issues relating to bit imbalance were well known and studied in the prior art for at least the last decade.***

Warren et al. further teach the dependence of drill penetration rate on relative force balance.

In particular, note col. 1, line 28 to col. 2, line 21:

"Numerous studies have been made to find out what causes such destruction to the cutting elements. The inventors hereof have previously found that a substantial portion of the destructive forces are generated by radial imbalance forces that cause a drill bit to rotate about a rotational axis offset from the geometric center of the drill bit in such a way that the drill bit tends to wobble or "backwards whirl" about the borehole. This backwards whirling causes the center of rotation

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to change dramatically as the drill bit rotates about the borehole. Thus, the cutting elements travel faster, sideways, and backwards and thus are subject to greatly increased impact loads which cause the destruction of the cutting elements.

More specifically, *circumferential drilling imbalance forces exist to some degree on every drill bit and these forces tend to push the drill bit towards the side of the borehole. In a typical drill bit, gauge cutting elements are designed to cut the edge of the borehole. During the cutting process, the effective friction between the cutting elements near the gauge area increase and, thus, the instantaneous center of rotation becomes some point other than the geometric center of the drill bit. When this happens, the usual result is for the drill bit to begin to backwards whirl around the borehole. This whirling process regenerates itself because sufficient friction is always generated between the drill bit gauge area and the borehole wall, no matter what the orientation of the drill bit, from the centrifugal forces generated by the rapid acceleration of the drill bit.*

Various methods and equipment have been proposed to eliminate or reduce these imbalance forces, including using dynamically balanced lower drill string assemblies and very precisely aligning the cutting elements to reduce imbalance forces.

Various designs of drill bits have been developed to improve penetration rates by aligning the cutting elements in a plurality of equal radius sets, with each set being in overlapping radial relationship. One such drill bit design is disclosed in U.S. Pat. No. 4,545,441. Further, various attempts at improving cutting element life have been made by varying the back or side rake or angle of attack of the cutting elements, i.e., the angle at which the face of the cutting element addresses the formation with respect to the formation surface. The benefits of varying such back rake angles are disclosed in "The Effect Of Back Rake On The Performance Of Small-Diameter Polycrystalline Diamond Rock Bits: ANOVA Tests," Journal of Energy Resources Technology, Vol. 108, No. 4, pp. 305-309, December 1986; U.S. Pat. No. 4,660,659; U.S. Pat. No. 4,440,247; U.S. Pat. No. 4,186,628 and U.S.S.R. Pat. No. 395,559. The effects of varying side rake angles is disclosed in Hunnj SPE-10152 (1981).

There is no disclosure or suggestion in any of the above-identified article or patents of arranging cutting elements specifically to prevent or reduce the effects of destructive bit whirl. There is a need for a drill bit design which incorporates features designed specifically for preventing bit whirl and improving cutting element life."

12. Any inquiry concerning this communication or earlier communications from the examiner should be:

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directed to: Dr. Hugh Jones telephone number (571) 272-3781,

Monday-Thursday 0830 to 0700 ET,

or

the examiner's supervisor, Kamini Shah, telephone number (571) 272-2279.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, telephone number (703) 305-3900.

mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

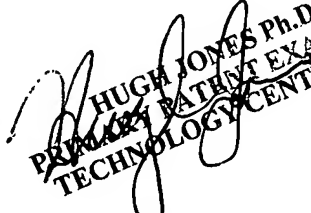
(703) 308-9051 (for formal communications intended for entry)

or (703) 308-1396 (for informal or draft communications, please label *PROPOSED* or *DRAFT*).

Dr. Hugh Jones

Primary Patent Examiner

October 13, 2005


HUGH JONES Ph.D.
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